

Appl. No. 10/822583

In the Claims:

Listing of all claims:

1-47 (Cancelled.)

1 48. (Currently Amended) An apparatus for welding by
2 depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 a power source having a first waveform during a
6 short condition and a second waveform during an arc
7 condition as an output, wherein the output is in
8 electrical communication with the welding wire;
9 a feedback circuit, for providing a signal
10 indicative of the output being in the short or the arc
11 condition and further having as an output a real-time
12 signal indicative of the heat input to each drop;
13 a controller, coupled to the feedback circuit,
14 and having a control output provided to the power source,
15 wherein the control output commands the first waveform to
16 have a desired and controlled current waveform and the
17 second waveform to have a desired and controlled voltage
18 waveform.

1 49. (Previously Presented) The apparatus of claim
2 48, wherein the feedback circuit includes a comparator.

1 50. (Previously Presented) The apparatus of claim
2 49, wherein the comparator receives a threshold voltage and a
3 signal responsive to output voltage as inputs.

51. (Cancelled.)

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1 52. (Currently Amended) The apparatus of claim ~~48~~
2 ~~51~~, wherein the controller controls the first and second
3 waveforms to provide a desired mass deposition rate responsive
4 to a wire feed speed and a distance from a tip of the wire to
5 the workpiece.

1 53. (Previously Presented) The apparatus of claim
2 52, wherein the feedback circuit has an output current
3 feedback signal and an output voltage feedback signal provided
4 to the controller, and wherein the controller controls the
5 first waveform in response to the output current feedback
6 signal and the second waveform in response to the arc voltage
7 feedback signal.

1 54. (Previously Presented) The apparatus of claim
2 48, wherein the feedback circuit has an output current
3 feedback signal and an output voltage feedback signal provided
4 to the controller, and wherein the controller controls the
5 first waveform in response to the output current feedback
6 signal and the second waveform in response to the arc voltage
7 feedback signal.

1 55. (Currently Amended) An apparatus for welding by
2 depositing drops of molten metal at the end of a
3 consumable welding wire into a weld puddle by short
4 circuit transfer welding, comprising:
5 power means for providing power in the form of
6 a first waveform during a short condition and a second
7 waveform during an arc condition to the welding wire;
8 feedback means for providing a signal
9 indicative of the output being in the short or the arc
10 condition and for providing a real-time signal indicative
11 of the heat input to each drop;

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12 control means for controlling the power means
13 in response to the feedback means, wherein the power
14 means is controlled such that the first waveform has a
15 desired and controlled current waveform and the second
16 waveform has a desired and controlled voltage waveform.

1 56. (Previously Presented) The apparatus of claim
2 55, wherein the feedback means includes a means for comparing
3 two signals.

1 57. (Previously Presented) The apparatus of claim
2 56, wherein the comparator means receives a threshold voltage
3 and a signal responsive to output voltage as inputs.

58. (Cancelled.)

1 59. (Previously Presented) The apparatus of claim
2 57, wherein control means includes means for controlling the
3 first and second waveforms to provide a desired mass
4 deposition rate responsive to a wire feed speed and a distance
5 from a tip of the wire to the workpiece.

1 60. (Previously Presented) The apparatus of claim
2 55, wherein the feedback means provides an output current
3 feedback signal and an output voltage feedback signal provided
4 to the control means, and wherein the control means includes
5 means for controlling the first waveform in response to the
6 output current feedback signal and the second waveform in
7 response to the arc voltage feedback signal.

1 61. (Currently Amended) A method of short circuit
2 welding including depositing a plurality of successive
3 drops, comprising:

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4 providing power in the form of a first waveform
5 during a short condition and a second waveform during an
6 arc condition to a welding wire;
7 providing a feedback signal indicative of the
8 output being in the short or the arc condition providing
9 a real-time signal indicative of the heat input to each
10 of the plurality of successive drops;
11 controlling the power in response to the
12 feedback such that the first waveform has a desired and
13 controlled current waveform and the second waveform has a
14 desired and controlled voltage waveform.

1 62. (Previously Presented) The method of claim
2 61, further comprises comparing two signals.

1 63. (Previously Presented) The method of claim
2 62, wherein comparing includes comparing a threshold voltage
3 and a signal responsive to output voltage.

64. (Cancelled.)

1 65. (Previously Presented) The method of claim
2 61, further comprising controlling the first and second
3 waveforms to provide a desired mass deposition rate responsive
4 to a wire feed speed and a distance from a tip of the wire to
5 the workpiece.

1 66. (Previously Presented) The method of claim
2 63, further comprising providing an output current feedback
3 signal and an output voltage feedback signal to the control
4 means, and controlling the first waveform in response to the
5 output current feedback signal and the second waveform in
6 response to the arc voltage feedback signal.

67. (Cancelled.)